

WHAT IS CLAIMED IS:

- 1 1. A method for making an aluminum oxide component, the method
2 comprising:
 - 3 providing an amount of aluminum oxide in particle form, wherein the aluminum
4 oxide has less than about 100 parts per million of sodium and less than about 600 parts per
5 million of silica;
 - 6 grinding the aluminum oxide with media that comprise aluminum oxide ceramic
7 pieces that have less than about 200 parts per million of sodium to deagglomerate and reduce
8 the particle size of the aluminum oxide;
 - 9 placing the ground aluminum oxide into a slurry;
 - 10 adding a low sodium grade binder to the slurry;
 - 11 drying the slurry to provide an aluminum oxide powder having a sodium content that
12 is less than about 200 parts per million;
 - 13 forming the powder into a certain shape; and
 - 14 thermally treating the formed powder to produce an aluminum oxide component
15 having a low sodium and low silica content.
- 1 2. A method as in claim 1, wherein the powder is thermally treated at a
2 temperature in the range from about 1580 degrees C to about 1670 degrees C for about 2 to
3 about 10 hours.
- 1 3. A method as in claim 1, wherein the aluminum oxide component has a
2 dielectric loss value that is less than about $5 \times 10(-5)$.
- 1 4. A method as in claim 1, wherein the binder comprises polyethylene
2 glycol.
- 1 5. A method as in claim 1, wherein the slurry is spray dried.
- 1 6. A method as in claim 1, wherein the aluminum oxide has a purity of at
2 least about 99.8%.
- 1 7. A method as in claim 1, wherein the component is selected from a
2 group consisting of a microwave window, a cell phone base, and a semiconductor
3 manufacturing component.

1 8. A method as in claim 1, wherein the aluminum oxide in particle form
2 is produced from mined bauxite.

1 9. A method as in claim 1, wherein the ground aluminum oxide is placed
2 into the slurry using a wet mill process having media that comprise aluminum oxide ceramic
3 pieces that have less than about 200 parts per million of sodium.

1 10. A method as in claim 1, wherein the aluminum oxide has a mean
2 particle size in the range from about 0.5 microns to about 4 microns after the grinding step.

1 11. A ceramic member, comprising:
2 a ceramic component comprising aluminum oxide, wherein the aluminum oxide
3 comprises at least about 99.8% of the ceramic member, wherein the aluminum oxide was
4 formed from aluminum oxide particles having less than about 100 parts per million of sodium
5 and less than about 600 parts per million of silica, and that was ground with media that
6 comprise aluminum oxide ceramic pieces that have less than about 200 parts per million of
7 sodium.

1 12. A ceramic member as in claim 11, wherein the ceramic member
2 contains less than about 200 ppm of sodium.

1 13. A ceramic member as in claim 11, wherein the ceramic member
2 contains less than about 1,500 ppm of silica.

1 14. A ceramic member as in claim 11, wherein the ceramic component is
2 fashioned in the shape of a cell phone base station.

1 15. A ceramic member as in claim 11, wherein the ceramic component is
2 fashioned in the shape of a vacuum chamber cover.

1 16. A ceramic member as in claim 11, wherein the ceramic component is
2 fashioned in the shape of a semiconductor manufacturing part.

3